the recording medium composition of the invention. For example, a recorded hologram plate, as an original image, is superposed closely on the surface of the protective material of the recording material having the three-layer structure described above, and the hologram plate having the original image is irradiated with light using a high pressure mercury lamp. Interference occurs at the recording layer of the non-recorded recording medium between reference light suffering no diffraction and diffracted light of the original image (i.e., object light), and the hologram is copied onto the recording medium to obtain a hologram of high fidelity to the original image. When a hologram of good quality can be obtained by the copying process described above, such becomes evidence that a hologram can be produced by interference of laser light.

After producing a hologram in the recording medium obtained by using the recording material composition of the invention, the prepolymer (A) remains in the recording medium. Therefore, it is considered that the remaining allyl-based prepolymer is functionally utilized. For example, when the substrate is formed with an unsaturated polyester resin, and the remaining allyl group of the prepolymer (A) is chemically bonded to an unsaturated group of the resin of the substrate, the recording material composition of the invention can be firmly fixed on the substrate. By utilizing the function of the remaining allyl group of the allyl-based prepolymer (A), various properties can be given to the material characteristics of the hologram to obtain a hologram that has physical properties applicable to various kinds of usage.

In the recording material composition of the invention, the

allyl-based prepolymer (A) and the (meth)acrylate-based compound (B) are completely dissolved each other before exposure to light, and on irradiation with laser light, the (meth)acrylate-based compound (B) is polymerized through photo-polymerization, and finally becomes a hologram recording layer.

Accordingly, when the two-layer structure, which comprises a substrate having the recording material composition coated thereon, or the three-layer structure, which comprises the two-layer structure having a protective layer formed on the recording layer, is exposed to an interference pattern, photo-polymerization of the (meth)acrylate-based compound (B) having a high photo-polymerization reactivity begins to occur at a portion of a large light amount, and volume shrinkage occurs at that portion. An unreacted compound flows from a portion of a small light amount into a concave portion formed by the volume shrinkage, and the allyl-based prepolymer (A) diffuses into the portion of a small light amount by phase separation between the allyl-based prepolymer (A) and the (meth)acrylate-based compound (B).

The (meth)acrylate-based compound (B) is diffused to migrate into the portion of a large light amount to further proceed the photo-polymerization. In the portion of a small light amount, on the other hand, the photo-polymerization of the allyl-based prepolymer (A) proceeds solely or with a polymer of the (meth)acrylate-based compound (B) with a small delay from the portion of a large light amount. As a result, a structure wherein the polymer of the (meth)acrylate-based compound (B) is accumulated in the portion of a large light amount, the allyl-based

prepolymer (A) is accumulated in the portion of a small light amount, and they are linked each other by radical copolymerization is formed.

When the viscosity reducing agent (E) exists in the system, this agent is a component to adjust viscosity and compatibility of the system and functions as a component to promote the separation between the allyl-based prepolymer (A) and the (meth)acrylate-based compound (B). This agent exists uniformly in the system in the early stage of the exposure to light but is finally excluded into the portion of a small light amount, namely to the allyl-based prepolymer (A) side. Accordingly, a compositional distribution corresponding to an interference pattern, which is a light amount distribution of the interference fringe, i.e., a portion having large amounts of the allyl-based prepolymer (A) and the viscosity reducing agent (E) and a portion having a large amount of the (meth)acrylate-based compound (B) are formed as a distribution of refractive indexes, i.e., a hologram.

Similarly, when the thermoplastic resin (D) exists in the system, this resin is a component to adjust the viscosity and the compatibility of the system and is finally excluded to the allyl-based prepolymer (A) side.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a schematic drawing showing an example of a transmission type hologram.

Fig. 2 is a schematic drawing showing an example of a reflection type hologram.